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SODIUM SULPHITE: A DANGEROUS FOOD-PRESERVATIVE.*

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THE extent to which sodium sulphite is used as an admixture to meat and canned vegetables is not commonly known, and those who are aware of its use are generally misinformed as to the reason of its employment. It is classed as a food preservative, but its antiseptic properties are comparatively feeble. It is used more especially on account of its effect on the appearance of the food to which it is added, its preservative influence being decidedly a minor consideration. It confers upon mince meat an abnormally brilliant red color, which conveys to the purchaser the idea of freshness; and it has a bleaching effect on canned asparagus and canned corn, thus making these articles more attractive to the eye. Its most extensive use is in the preparation of that form of minced meat which we know as "Hamburg steak." This is made from beef trimmings and inferior parts of the carcass; and after it has received its chemical treatment, it takes on a redness that is much more pleasing to the eye than the grayish-brown color which develops within a few hours if no sulphite is added. This color, due to the fact that the salt favors the formation of oxyhemoglobin, is very persistent on the exterior of the mass, but is not so marked in the inner portions, which, however, acquire the same appearance on exposure to the air. Persisting as it does, meat which is in reality well advanced in decomposition is readily disposed of as perfectly fresh, for although the number of bacteria per gram may run as high as 500 millions, it may give off no marked odor. Aside, then, from the effects of the compound on the system, it may fairly be said that, on account of its masking decomposition, it is an undesirable admixture.

The first experiments which yielded definite results showing that the salt acts poisonously on the system were reported in 1896

* Read at the meeting of the Laboratory Section of the American Public Health Association, October 26, 1903.

by Kionka,¹ who, working with dogs, discovered evidence of extensive injury in practically all of the organs. His results were accepted for a time as conclusive; but, in 1901, Abel² reported that daily doses of 0.5 to 1.0 gram, and once as much as 2.5 grams, taken by himself and seventeen others for twelve days, caused no discomfort nor observable effects of any kind whatever. Then, Lebbin and Kallmann³ fed young dogs for sixty days with meat containing 0.20 per cent., and found no lesions on post-mortem examination. They gave large doses (10 grams) in 25 per cent. and 40 per cent. solutions to rabbits by means of the stomach-tube, and observed nothing more serious than diarrhea and slight congestion of a portion of the gastric mucosa. An equal weight of common salt in 30 c.c. of water caused death within two hours. Finding, in addition, that three men, who, for three days, ate meat containing 0.10 per cent. of sulphite, were not made sick, they assailed Kionka's work, and, with others, contended that sulphites should be regarded as harmless in all respects. This led Kionka⁴ to repeat his experiments with a larger number (six) of dogs, which he fed nine weeks with meat containing 0.20 per cent., which is the proportion commonly recommended. During the whole period, none of the animals showed any outward sign of poisoning; and, in fact, all gained in weight up to the day they were killed, when post-mortem examination showed in each subject evidence of marked degenerative changes in various organs. Numerous small hemorrhages were observed in the lungs, endocardium, stomach, intestines, and liver, and all showed acute nephritis. Practically the same results were obtained, also in dogs, by Schulz.⁵ Kionka repeated Lebbin's experiments with rabbits, and found that they died very quickly.

A number of writers have reported discomfort, eructations, headache, and other effects attributed to treated meats, and others have recorded negative results from similar experience, but, for obvious reasons, such evidence is hardly worthy of discussion.

Before I happened to see Kionka's second paper and Schulz's communication, I began an experiment with cats, giving them a daily feed of freshly hashed beef, to which was added 0.20 per cent, of pure crystallized sodium sulphite. While it was in progress I,

saw both papers and concluded to extend the time considerably beyond that covered by Kionka's experiment. Six cats were under observation, one being a control and receiving the same weight of untreated meat. From the start, all six of the animals, which were of the homeless, ill-fed, scavenging kind, gained in weight, but about the ninth week, at which time Kionka killed his dogs, all except the control began to lose. The weekly losses were not constant: sometimes slight gains were observed; but these were succeeded by larger losses, so that the general trend of the weight-curve was downward. At no time did any of the animals show any outward evidence of poisoning up to five months, when all were killed. On section, the macroscopic appearances were negative in all respects; but microscopic examination of the hardened organs, made by Dr. Tyzzer, of the Pathological Laboratory of the Harvard Medical School, showed, in every subject, excepting the control, a parenchymatous degeneration of the kidneys. Each showed cloudy swelling and marked fatty degeneration of the renal epithelium; and in one case there was an acute interstitial nephritis in addition to and probably dependent upon parenchymatous changes. Otherwise, the results of the examination were essentially negative. The control cat showed no pathological changes whatever. She continued to gain in weight to the end of the experiment.

Although the lesions produced were much less extensive than those observed in Kionka's and Schulz's dogs, we may conclude that, at least for animals, and probably for the human subject, sodium sulphite is, as Kionka first stated, a dangerous admixture to food.

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